

What is claimed is:

1. A lighting system for stage, theatrical and architectural lighting, comprising  
frame means for supporting a plurality of light emitting diodes,  
means for mounting each diode of said plurality of diodes to said frame means  
and simultaneously for positioning said plurality of diodes wherein each discrete diode  
light beam is directed to a prescribed focal point (target zone) and thereupon directed to a  
predetermined illumination area, and

circuit board means structurally associated with said frame means for transmitting  
and controlling electrical voltage to said plurality of light emitting diodes.

2. The lighting system in accordance with claim 1, wherein said frame means  
includes a mounting template, and said means for mounting includes said mounting  
template forming a plurality of individually positioned mounting steps wherein each said  
diode of said plurality of diodes is positioned at one mounting step of said plurality of  
mounting steps wherein each said discrete diode light beam is independently directed to  
said focal point.

3. The lighting system in accordance with claim 2, wherein said mounting  
template is configured so as to define a hollow volume having an interior volume surface  
and a closed plane aperture having a periphery, said plurality of diodes being positioned  
and arranged at said mounting steps so as to assume the configuration of said interior  
volume surface, said diode light beams emitting from said diodes being directed through  
said closed plane aperture.

4. The lighting system in accordance with claim 3, wherein said hollow volume is configured as a hollow cone wherein said closed plane aperture is configured as a cone closed plane aperture defined by a cone periphery, and said interior volume surface is a cone inner volume surface defined between the vertex of said cone and said cone periphery.

5. The lighting system in accordance with claim 4, wherein said periphery of said cone closed plane aperture is configured as a circle.

6. The lighting system in accordance with claim 3, wherein said hollow volume is configured as a hollow semi-ellipse wherein said closed plane aperture is configured as an ellipsoidal-based closed plane aperture defined by an ellipsoidal-based periphery and said interior volume surface is defined by said ellipsoidal interior volume surface and said ellipsoidal periphery.

7. The lighting system in accordance with claim 6, wherein said ellipsoidal periphery is configured as a circle.

8. The lighting system in accordance with claim 3, wherein said hollow volume is configured as a hollow hemisphere wherein said closed plane aperture is configured as an hemispherical closed plane aperture defined by a hemispherical periphery and said interior volume surface is defined by a hemispherical interior volume surface and said

hemispherical periphery.

9. The lighting system in accordance with claim 8, wherein said hemispherical periphery is configured as a circle.

10. The lighting system in accordance with claim 2, wherein said mounting template is configured substantially as a planar surface, said plurality of diodes being positioned and arranged at said mounting steps so as assume the configuration of said planar surface.

11. The lighting system in accordance with claim 2, further including a nonconductive housing, said mounting template being positioned in said nonconductive housing.

12. The lighting system in accordance with claim 1, said circuit board means is a unitary rigid circuit board and frame including a plurality of diode electrical connectors, and said means for mounting includes said plurality of diodes having a plurality of diode electrical leads connected to said plurality of diode electrical connectors, and said means for mounting includes said plurality of electrical leads being individually positioned and angled wherein said plurality of diodes are positioned and arranged wherein each said discrete diode light beam is independently directed to said focal point.

13. The lighting system in accordance with claim 12, wherein said plurality of

diode electrical leads are stiff electrical leads.

14. The lighting system in accordance with claim 13, further including a means of securing said plurality of diodes to said unitary rigid circuit board and frame, said means for securing being said stiff electrical leads.

15. The lighting system in accordance with claim 12, wherein said unitary circuit board and frame is configured so as to define a hollow volume having an interior volume surface and a closed plane aperture having a periphery, said plurality of diodes being positioned so as to assume the configuration of said interior volume surface, said discrete diode light beams emitting from said diodes being directed through said closed plane aperture.

16. The lighting system in accordance with claim 15, wherein said hollow volume is configured as a hollow cone wherein said closed plane aperture is configured as a cone closed plane aperture defined by a cone periphery, and said interior volume surface is a cone inner volume surface defined between the vertex of said cone and said cone periphery.

17. The lighting system in accordance with claim 16, wherein said periphery of said cone closed plane aperture is configured as a circle.

18. The lighting system in accordance with claim 15, wherein said hollow volume

is configured as a hollow semi-ellipse wherein said closed plane aperture is configured as an ellipsoidal-based closed plane aperture defined by an ellipsoidal-based periphery and said interior volume surface is defined by said ellipsoidal interior volume surface and said ellipsoidal periphery.

19. The lighting system in accordance with claim 18, wherein said ellipsoidal periphery is configured as a circle.

20. The lighting system in accordance with claim 15, wherein said hollow volume is configured as a hollow hemisphere wherein said closed plane aperture is configured as an hemispherical closed plane aperture defined by a hemispherical periphery and said interior volume surface is defined by a hemispherical interior volume surface and said hemispherical periphery.

21. The lighting system in accordance with claim 20, wherein said hemispherical periphery is configured as a circle.

22. The lighting system in accordance with claim 15, wherein said unitary rigid circuit board and frame means is configured substantially as a planar surface, said plurality of diodes being positioned with said plurality of stiff electrical leads so as to assume the configuration of said planar surface.

23. The lighting system in accordance with claim 1, further including an imaging

gate defining a gate aperture positioned at a distance from said frame means.

24. The lighting system in accordance with claim 23, further including a gobo operatively mounted with said imaging gate.

25. The lighting system in accordance with claim 23, further including a shutter blade operatively mounted with said imaging gate.

26. The lighting system in accordance with claim 23, further including focusing lens means for intercepting said plurality of diode discrete diode light beams and directing said plurality of diode light beams as a focused total diode light beam to said illumination area, said focusing lens means being positioned between said imaging gate and said illumination area.

27. The lighting system in accordance with claim 26, wherein said focal point (target area) is located between said imaging gate and said focusing lens.

28. The lighting system in accordance with claim 27, wherein said focal point (target area) is a virtual focal point (target area) located between said focusing lens means and said illumination area.

29. The lighting system in accordance with claim 26, further including collimating lens means spaced from said imaging gate, said focusing lens means being

spaced from said collimating lens means, said collimating lens means being for collecting said plurality of diode discrete light beams emitted by said plurality of diodes being supported by said frame means and directing a collimated diode total light beam to said focusing lens, said focusing lens being for collecting said collimated diode total light beam and directing a focused diode total light beam to said illumination area.

30. The lighting system in accordance with claim 29, wherein said collimating lens and said focusing lens are movable relative to one another and to said imaging gate.

31. The lighting system in accordance with claim 1, wherein said light emitting diodes are white light emitting diodes.

32. The lighting system in accordance with claim 1, wherein said light emitting diodes are colored light emitting diodes selected from the group consisting of red, green, and blue light emitting diodes.

33. The lighting system in accordance with claim 1, wherein said light emitting diodes are light emitting diodes selected from the group consisting of cyan, yellow and magenta light emitting diodes.

34. The lighting system in accordance with claim 3, wherein said circuit board means is a circuit board configured in accordance with the configuration of said mounting template and positioned in proximity to said mounting template.

35. The lighting system in accordance with claim 34, further including a mounting board positioned between said mounting template and said circuit board.

36. The lighting system in accordance with claim 2, further including means for securing said plurality of diodes to said mounting template, said means for securing being wherein each said diode is removably mounted to each of said mounting steps.

37. The lighting system in accordance with claim 36, wherein each said diode is removably glued to each of said mounting steps.

38. The lighting system in accordance with claim 1, wherein said plurality of diodes are cylindrical in configuration and wherein said frame means includes a mounting template and said means for mounting includes said mounting template forming a plurality of individually positioned cylindrical recesses wherein each said diode of said plurality of diodes is positioned within one of said plurality of cylindrical recesses wherein each said discrete diode light beam is independently directed to said focal point.

39. The lighting system in accordance with claim 38, wherein said plurality of diodes have diode diameters and said plurality of cylindrical recess have recess diameters slightly smaller than said diode diameters, said plurality of diodes being removably positioned in said plurality of recess diameters in a press-fit relationship.



40. The lighting system in accordance with claim 39, further including electrical leads between said circuit board means and said plurality of diodes wherein said electrical leads are removably connected to said plurality of diodes.

41. The lighting system in accordance with claim 39, further including electrical leads between said circuit board means and said plurality of diodes wherein said electrical leads are removably connected to said circuit board means.

42. A blank for forming a frame defining a hollow volume for a diode lighting system for stage, theatrical and architectural lighting comprising:

a thin flat flexible blank made of a nonconductive material having opposed top and bottom sides,

said blank including a center portion and a plurality of separate portions (petals) integral with and extending outwardly from said center portion, each said petal having opposed side edges and a outer edge joined to said side edges,

said blank including a plurality of solder pads for electrical connections secured to said blank, and

a plurality of means for securing said plurality of petals.

43. The blank according to claim 42, wherein said opposed side edges of said plurality of petals are slightly outwardly curved and said outer edges of said petals are linear, whereby said blank can be formed into a frame configured is a semi-ellipse in an assembled mode.

44. The blank according to claim 42, wherein said opposed side edges of said plurality of petals are linear and said outer edges of said petals are outwardly curved in the assembled mode, whereby said blank can be formed into a frame configured as a semi-sphere in an assembled mode.

46. The blank according to claim 42, wherein said blank has opposed top and bottom sides and further defines a plurality of holes between said top and bottom sides in association with said solder pads for passing electrical leads.

47. The blank according to claim 46, further including a plurality of solder pads positioned in alignment with said plurality of holes, said solder pads being located on both said top and said bottom sides.

48. The blank according to claim 42, further including a printed circuit for electrically connecting surface mount light emitting diodes to be mounted to said top side of said blank after said blank is configured as a hollow volume, said printed circuit being associated with said top side of said blank.

49. The blank according to claim 42, wherein said blank has an approximate thickness of approximately 0.01 inches.

50. The blank according to claim 42, wherein said blank is comprises a polyimide

material.

51. A method for assembling a frame configured as a hollow volume for mounting a plurality of diodes for a diode lighting system for stage, theatrical, and architectural, lighting comprising the following steps:

- a. providing a flexible blank having  
opposed top and bottom sides,  
a center portion integral with a plurality of outwardly extending portions (petals),  
each said petal having and opposed side edges and an outer edge connected to said side edges, and  
a plurality of means for securing said plurality of petals in an assembled mode,
- b. moving said petals into alignment around said center portion so as to form a frame configured as a hollow volume with said top side of said blank being the inner surface of said hollow volume and said bottom side of said blank being the outer surface of said hollow volume;
- c. joining said opposed side edges and aligning said outer edges so as to form a circular rim of said hollow volume; and
- d. securing said plurality of petals by employing said means for securing so as to assemble a frame defining a rigid hollow volume.

52. The blank according to claim 51, wherein said blank includes said opposed side edges of said plurality of petals being slightly outwardly curved and said outer edges of said petals being linear, whereby said blank can be assembled into a semi-ellipse in an

assembled mode.

53. The blank according to claim 52, wherein said opposed side edges of said plurality of petals are linear and said outer edges of said petals are outwardly curved in the assembled mode, whereby said blank can be assembled into a semi-sphere in the assembled mode.

54. The blank according to claim 51, wherein said blank has an approximate thickness of approximately 0.01 inches.

55. The blank according to claim 51, wherein said board is made of a polyimide material.

56. A blank for forming a frame defining a hollow volume configured as a cone for a diode lighting system for stage, theatrical and architectural lighting comprising:

a flexible blank made of a nonconductive material having opposed top and bottom sides,

said blank including a first arced side and a second arced side spaced from and concentric with said first arced side, said second arced side being greater than said first arced side, said blank further including a pair of opposed linear sides connected to said first and second arced sides, and

a plurality of means connected to said blank for securing said pair of opposed linear sides so as to form a rigid cone-shaped hollow volume.

57. The blank according to claim 56, further including a tab connected to said second arced side, said tab having electrical control circuitry mounted thereto.

58. The blank according to claim 56, further including means for mounting the assembled frame to an external fixture.

59. A lighting system for stage, theatrical and architectural lighting, comprising a sandwich frame for supporting a plurality of light emitting diodes, said sandwich frame including a positive electrically conductive layer and a negative electrically conductive layer interposed between layers of biasable insulating foam,

said sandwich frame defining a hollow volume having an interior volume surface and a closed plane aperture having a circular periphery, said plurality of diodes being positioned within said interior volume in association with said interior volume surface, said diode light beams emitting from said plurality of diodes being directed through said closed plane aperture,

means for mounting each diode of said plurality of diodes to said frame and simultaneously for positioning said plurality of diodes wherein each discrete diode light beam is directed to a prescribed focal point (target zone) and thereupon directed to a predetermined illumination area,

said means for mounting including at least one pin removably positioned in said layers of foam, said at least one pin including positive and negative electrical leads in electrical contact with said positive and negative conductive layers,

said biasable foam having an elasticity threshold at least equal to the maximum

pressure exerted by said at least one pin; and

electrical power for transmitting and controlling electrical voltage to said positive and negative conductive layers and to said plurality of light emitting diodes.

60. The lighting system according to claim 59, wherein said means for mounting includes a plurality of diode mounts secured to said interior volume surface, said diode mounts having opposed top and bottom diode mount surfaces, said bottom diode mount surfaces being contoured to said interior volume surface and said top diode mount surfaces being planar with said diodes being secured to said planar top diode mount surfaces, said diode mounts being individually oriented to position each of said plurality of diodes so as to direct each said discrete diode light beam to said target zone.

61. The lighting system according to claim 60, wherein each said diode mount defines two passages wherein are positioned said positive and negative electrical leads.

62. The lighting system according to claim 61, wherein said at least one pin includes an elongated cylindrical pin wall defining a pin passage, wherein are positioned said positive and negative electrical leads.

63. The lighting system according to claim 62, wherein said cylindrical pin wall includes nonconductive wall portions and isolated positive and negative conductive wall portions in electrical contact with said positive and negative leads, respectively, said positive and negative conductive wall portions also being in electrical contact with said

positive and negative conductive layers, respectively.

64. The lighting system according to claim 59, wherein said means for mounting including at least one mounting pin removably positioned in said layers of foam is two mounting pins removably positioned in said foam, said two mounting pins including an electrically conductive long mounting pin and an electrically conductive short mounting pin, said long mounting pin being in electrical contact with one of said positive and said negative conductive layers, and said short mounting pin being in electrical contact with the other of said of said positive and negative conductive layers.

65. The lighting system according to claim 64, wherein said long mounting pin includes a nonconductive outer wall positioned at said other of said positive and said negative conductive layers.

66. The lighting system according to claim 59, wherein said layers of biasable insulating foam include an inner foam layer proximate said diodes, an outer foam layer distal said diodes and a middle foam layer positioned between said inner and said outer foam layers.

67. The lighting system according to claim 66, wherein one of said positive and negative conductive layers is positioned between said inner and said middle foam layers and the other of said positive and negative conductive layers is positioned between said middle and said outer foam layers.

68. The lighting system according to claim 67, wherein said positive and negative conductive layers are made of a conductive metal.

69. The lighting system according to claim 67, wherein said positive and negative conductive sheets are made of a multi-sheet assembly of material having elastic return properties and electrically conductive material.

70. The lighting system according to claim 67, wherein said positive and negative conductive sheets are made of a conductively loaded foam having elastic return properties.

71. The lighting system according to claim 67, wherein a first sheet of material having elastic recovery properties is interposed between said one of said positive and negative conductive sheets and said middle foam layer and a second sheet of material having elastic recovery properties is interposed between said other of said positive and negative conductive sheets and said outer foam layer.

72. The lighting system according to claim 71 wherein said first and second sheets of material having elastic recovery properties are integrated with said middle foam layer and with said outer foam layer, respectively.

73. The lighting system according to claim 72, wherein said first and second



sheets of material having elastic return properties that are integrated with said middle foam layer and with said outer foam layer are comprised of layers of balls of elastomer embedded in said middle foam layer at said one of said positive and negative conductive layers and also embedded in said outer foam layer at said other of said positive and negative conductive layers.

74. The lighting system according to claim 73, wherein said first sheet of material having elastic recovery properties and second sheet of material having elastic recovery properties are made of an elastomeric cement.

75. The lighting system according to claim 73, wherein said first and second sheets of material having elastic recovery properties are made of a conductively loaded foam material.

76. The lighting system according to claim 59, wherein said plurality of diodes are positioned and arranged so as to assume the configuration of said interior volume surface.

77. The lighting system according to claim 59, wherein said hollow volume is configured as a semi-ellipse.

78. The lighting system according to claim 59, wherein said hollow volume is configured as a semi-sphere.

79. The lighting system according to claim 59, wherein said hollow volume is configured as a cone.

80. The lighting system in accordance with claim 59, wherein said light emitting diodes are white light emitting diodes.

81. The lighting system in accordance with claim 59, wherein said light emitting diodes are colored light emitting diodes selected from the group consisting of red, green, and blue light emitting diodes.

82. The lighting system in accordance with claim 59, wherein said light emitting diodes are light emitting diodes selected from the group consisting of cyan, yellow and magenta light emitting diodes.

83. The lighting system in accordance with claim 59, further including an imaging gate defining a gate aperture positioned at a distance from said frame means.

84. The lighting system in accordance with claim 59, further including a gobo operatively mounted with said imaging gate.

85. The lighting system in accordance with claim 59, further including a shutter blade

86. The lighting system in accordance with claim 59, further including focusing lens means for intercepting said plurality of diode discrete diode light beams and directing said plurality of diode light beams as a focused total diode light beam to said illumination area, said focusing lens means being positioned between said imaging gate and said illumination area.

87. The lighting system in accordance with claim 59, wherein said focal point (target area) is located between said imaging gate and said focusing lens.

88. The lighting system in accordance with claim 59, wherein said focal point (target area) is a virtual focal point (target area) located between said focusing lens means and said illumination area.

89. The lighting system in accordance with claim 59, further including collimating lens means spaced from said imaging gate, said focusing lens means being spaced from said collimating lens means, said collimating lens means being for collecting said plurality of diode discrete light beams emitted by said plurality of diodes being supported by said frame means and directing a collimated diode total light beam to said focusing lens, said focusing lens being for collecting said collimated diode total light beam and directing a focused diode total light beam to said illumination area.

90. The lighting system in accordance with claim 89, wherein said collimating lens and said focusing lens are movable relative to one another and to said imaging gate.

91. The lighting system according to claim 60, wherein said plurality of diode mounts are connected together so as to form a unified diode mounting template.

92. A lighting system for stage, theatrical and architectural lighting, comprising a sandwich frame for supporting a plurality of light emitting diodes, said sandwich frame including a positive electrically conductive layer and a negative electrically conductive layer interposed between layers of biasable insulating foam,

said sandwich frame having a surface, said plurality of diodes being positioned at said surface,

means for mounting each diode of said plurality of diodes to said frame at said surface and simultaneously for positioning said plurality of diodes wherein each discrete diode light beam is directed to a prescribed remote focal point (target zone) and thereupon directed to a predetermined illumination area,

said means for mounting including at least one pin removably positioned in said layers of foam, said at least one pin including positive and negative electrical leads in electrical contact with said positive and negative conductive layers,

said biasable foam having an elasticity threshold at least equal to the maximum pressure exerted by said at least one pin; and

electrical power for transmitting and controlling electrical voltage to said positive and negative conductive layers and to said plurality of light emitting diodes.

93. The lighting system according to claim 92, wherein said means for mounting

includes a plurality of diode mounts secured to said surface, said diode mounts having opposed top and bottom diode mount surfaces, said bottom diode mount surfaces being contoured to said surface and said top diode mount surfaces being planar with said diodes being secured to said planar top diode mount surfaces, said diode mounts being individually oriented to position each of said plurality of diodes so as to direct each said discrete diode light beam to said target zone.

94. The lighting system according to claim 92, wherein said plurality of diode mounts are joined together so as to form a unified diode mounting template including said plurality of diode mounts.

95. The lighting system according to claim 93, wherein each said diode mount defines two passages wherein are positioned said positive and negative electrical leads.

96. The lighting system according to claim 92, wherein said at least one pin includes an elongated cylindrical pin wall defining a pin passage, wherein are positioned said positive and negative electrical leads.

97. The lighting system according to claim 96, wherein said cylindrical pin wall includes nonconductive wall portions and isolated positive and negative conductive wall portions in electrical contact with said positive and negative leads, respectively, said positive and negative conductive wall portions also being in electrical contact with said positive and negative conductive layers, respectively.

98. The lighting system according to claim 92, wherein said means for mounting including at least one mounting pin removably positioned in said layers of foam is two mounting pins removably positioned in said foam, said two mounting pins including an electrically conductive long mounting pin and an electrically conductive short mounting pin, said long mounting pin being in electrical contact with one of said positive and said negative conductive layers, and said short mounting pin being in electrical contact with the other of said of said positive and negative conductive layers.

99. The lighting system according to claim 98, wherein said long mounting pin includes a nonconductive outer wall positioned at said other of said positive and said negative conductive layers.

100. The lighting system according to claim 92, wherein said layers of biasable insulating foam include an inner foam layer proximate said diodes, an outer foam layer distal said diodes and a middle foam layer positioned between said inner and said outer foam layers.

101. The lighting system according to claim 100, wherein one of said positive and negative conductive layers is positioned between said inner and said middle foam layers and the other of said positive and negative conductive layers is positioned between said middle and said outer foam layers.

102. The lighting system according to claim 92, wherein said positive and negative conductive layers are made of a conductive metal.

103. The lighting system according to claim 92, wherein said positive and negative conductive sheets are made of a multi-sheet assembly of material having elastic return properties and electrically conductive material.

104. The lighting system according to claim 102, wherein said positive and negative conductive sheets are made of a conductively loaded foam having elastic return properties.

105. The lighting system according to claim 100, wherein a first sheet of material having elastic recovery properties is interposed between said one of said positive and negative conductive sheets and said middle foam layer and a second sheet of material having elastic recovery properties is interposed between said other of said positive and negative conductive sheets and said outer foam layer.

106. The lighting system according to claim 105, wherein said first and second sheets of material having elastic recovery properties are integrated with said middle foam layer and with said outer foam layer, respectively.

107. The lighting system according to claim 105, wherein said first and second sheets of material having elastic return properties that are integrated with said middle

foam layer and with said outer foam layer are comprised of layers of balls of elastomer embedded in said middle foam layer at said one of said positive and negative conductive layers and also embedded in said outer foam layer at said other of said positive and negative conductive layers.

108. The lighting system according to claim 105, wherein said first sheet of material having elastic recovery properties and second sheet of material having elastic recovery properties are made of an elastomeric cement.

109. The lighting system according to claim 105, wherein said first and second sheets of material having elastic recovery properties are made of a conductively loaded foam material.

110. The lighting system according to claim 93, wherein said plurality of diode mounts are connected together so as to form a unified diode mounting template.

111. The lighting system according to claim 92, wherein said sandwich frame defines a hollow volume having a volume surface and a closed plane aperture having a circular periphery, said plurality of diodes being positioned within said interior volume in association with said interior volume surface, said diode light beams emitting from said plurality of diodes being directed through said closed plane aperture.

112. The lighting system according to claim 111, wherein said hollow volume is



configured as a semi-ellipse.

113. The lighting system according to claim 111, wherein said hollow volume is configured as a semi-sphere.

114. The lighting system according to claim 111, wherein said hollow volume is configured as a cone.

115. The lighting system according to claim 92, wherein said sandwich frame is configured substantially as a planar surface.

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